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MARSHALL STAR

In This Week's Star (Click to Expand)

Space Shuttle Endeavor Sails to Home Port for Final Time

Headquarters news release

Space shuttle Endeavour and its six-astronaut crew sailed home for the final time, ending a 16-day journey of more than 6.5 million miles with a landing at 1:35 a.m. CDT June 1 at Kennedy Space Center, Fla.

Image right: Space shuttle Endeavour makes its final landing at the Kennedy Space Center's Shuttle Landing Facility, completing a 16-day mission to the International Space Station. (NASA/Bill Ingalls)

STS-134 was the last mission for the youngest of NASA's space shuttle fleet. Since 1992, Endeavour flew 25 missions, spent 299 days in space, orbited Earth 4,671 times and traveled 122,883,151 miles.

"We are very proud of Endeavour's legacy, and this penultimate flight of the Space Shuttle Program once again demonstrated the amazing skill and dedication of our astronauts and the entire workforce," said NASA Administrator Charles Bolden. "As we begin the transition from the shuttle program to the commercial transportation of our crews and cargo, our ability to tackle big challenges remains steadfast and will ensure that NASA reaches even more destinations farther in the solar system."

Mark Kelly commanded the flight and was joined by Pilot Greg H. Johnson and Mission Specialists Mike Fincke, Drew Feustel, Greg Chamitoff and the European Space Agency's Roberto Vittori. Endeavour delivered the Alpha Magnetic Spectrometer-2, beginning a scientific voyage of discovery to our solar system and beyond from the International Space Station. By measuring cosmic rays, the spectrometer is designed to help researchers understand the origin of the universe and search for evidence of dark matter, strange matter and antimatter.

Endeavour also delivered the Express Logistics Carrier-3, a platform carrying spare parts that will sustain space station operations once the shuttles are retired from service. The astronauts performed four spacewalks to maintain space station systems and install new components.

These were the last scheduled spacewalks by shuttle crew members and brought the final number of shuttle excursions to 164. During 159 spacewalks for assembly and maintenance of the space station, astronauts and cosmonauts have spent

1,002 hours and 37 minutes outside the orbiting outpost.

Fincke set a new record for time a U.S. astronaut has spent in space when he reached his 377th day on May 27, surpassing previous record holder Peggy Whitson. With today's landing, Fincke's record now is at 382 days in space.

STS-134 was the 134th shuttle flight and the 36th shuttle mission dedicated to space station assembly and maintenance. With Endeavour and its crew safely home, the stage is set for the launch of shuttle Atlantis on its STS-135 mission, targeted to begin July 8.

Four veteran astronauts will deliver supplies and spare parts to the space station. The 12-day mission also will install an experiment designed to demonstrate and test the tools, technologies and techniques needed to refuel satellites in space robotically -- even satellites not designed to be serviced.

Chris Ferguson, a veteran of two previous shuttle missions, will command the flight. Doug Hurley will be the pilot, a role he filled on the STS-127 mission in 2009. Sandy Magnus and Rex Walheim will be the mission specialists. Magnus spent four and a half months aboard the station beginning in November 2008. Walheim flew on the STS-110 mission in 2002 and the STS-122 mission in 2008.

STS-135 will be Atlantis' 33rd mission and the 37th shuttle flight dedicated to space station assembly and maintenance. It will be the 135th and final mission of NASA's Space Shuttle Program.

For more information about the STS-134 mission and the upcoming STS-135 flight, visit: http://www.nasa.gov/shuttle.

For information about the space station, visit: http://www.nasa.gov/station.

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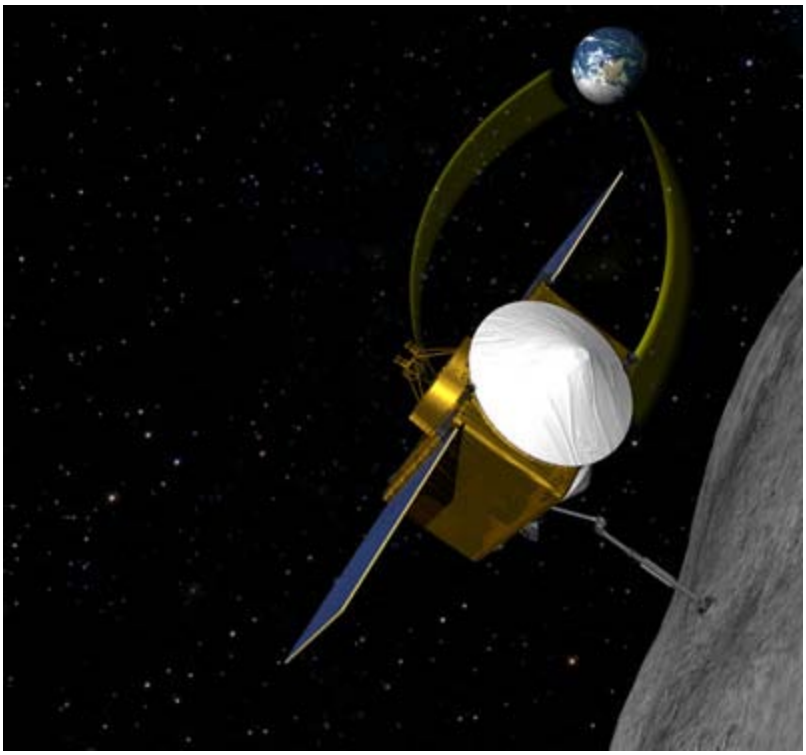
NASA to Launch New Science Mission to Asteroid in 2016

By Kim Newton



NASA will launch a spacecraft to an asteroid in 2016 and use a robotic arm to pluck samples that could better explain our solar system's formation and how life began. The mission, called Origins-Spectral Interpretation-Resource Identification-Security-Regolith Explorer, or OSIRIS-REx, will be the first U.S. mission to carry samples from an asteroid back to Earth.

Image left: Conceptual image of OSIRIS-Rex. (NASA/Goddard/University of Arizona)

"This is a critical step in meeting the objectives outlined by President Obama to extend our reach beyond low-Earth orbit and explore into deep space," said NASA Administrator Charlie Bolden. "It's robotic missions like these that will pave the way for future human space missions to an asteroid and other deep space destinations."

NASA selected OSIRIS-REx after reviewing three concept study reports for new scientific missions, which also included a sample return mission from the far side of the moon and a mission to the surface of Venus.

This is the third mission in NASA's New Frontiers Program. Marshall Space Flight Center manages the New Frontiers Program for the agency's Science Mission Directorate in Washington.

"OSIRIS-REx will be a challenging mission as it represents the first asteroid sample return mission for NASA," said Allen S.

Bacskay, deputy program manager of the Discovery and New Frontiers Program at Marshall. "The science looks to be literally 'out of this world!' Marshall and the New Frontiers Program are excited and ready to help the OSIRIS-REx mission become another one of NASA's science successes."

Asteroids are leftovers formed from the cloud of gas and dust - the solar nebula - that collapsed to form our sun and the planets about 4.5 billion years ago. As such, they contain the original material from the solar nebula, which can tell us about the conditions of our solar system's birth.

After traveling four years, OSIRIS-REx will approach the primitive, near Earth asteroid designated 1999 RQ36 in 2020. Once within three miles of the asteroid, the spacecraft will begin six months of comprehensive surface mapping. The science team then will pick a location from where the spacecraft's arm will take a sample. The spacecraft gradually will move closer to the site, and the arm will extend to collect more than two ounces of material for return to Earth in 2023. The mission, excluding the launch vehicle, is expected to cost approximately $800 million.

The sample will be stored in a capsule that will land at Utah's Test and Training Range in 2023. The capsule's design will be similar to that used by NASA's Stardust spacecraft, which returned the world's first comet particles from comet Wild 2 in 2006. The OSIRIS-REx sample capsule will be taken to NASA's Johnson Space Center in Houston. The material will be removed and delivered to a dedicated research facility following stringent planetary protection protocol. Precise analysis will be performed that cannot be duplicated by spacecraft-based instruments.

RQ36 is approximately 1,900 feet in diameter or roughly the size of five football fields. The asteroid, little altered over time, is likely to represent a snapshot of our solar system's infancy. The asteroid also is likely rich in carbon, a key element in the organic molecules necessary for life. Organic molecules have been found in meteorite and comet samples, indicating some of life's ingredients can be created in space. Scientists want to see if they also are present on RQ36.

"This asteroid is a time capsule from the birth of our solar system and ushers in a new era of planetary exploration," said Jim Green, director, NASA's Planetary Science Division in Washington. "The knowledge from the mission also will help us to develop methods to better track the orbits of asteroids."

The mission will accurately measure the "Yarkovsky effect" for the first time. The effect is a small push caused by the sun on an asteroid, as it absorbs sunlight and re-emits that energy as heat. The small push adds up over time, but it is uneven due to an asteroid's shape, wobble, surface composition and rotation. For scientists to predict an Earth-approaching asteroid's path, they must understand how the effect will change its orbit. OSIRIS-REx will help refine RQ36's orbit to ascertain its trajectory and devise future strategies to mitigate possible Earth impacts from celestial objects.

For more information about OSIRIS-REx, visit: http://www.nasa.gov/topics/solarsystem/features/osiris-rex.html.

Newton is a public affairs officer in the Office of Strategic Analysis & Communications.

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Center-wide Messaging Process Undergoes Changes

Due to budget constraints, the center-wide messaging process is being revised. A daily "Heads Up" message will continue to be distributed to the Marshall team by the Office of Strategic Analysis & Communications (and archived in Inside Marshall and ExplorNet), but only duly authorized officials of Marshall Center organizations will be able to submit messages for distribution in "Heads Up." Individuals seeking to initiate a center-wide message can work within their organization to do so or can post the message on the "Announcements" section of ExplorNet, located in the "MSFC Happenings" site accessible from the front page of ExplorNet. "This Just In" messages will no longer be provided; however, the Office of Center Operations will distribute emergency messages as needed. "Message from the Center Director" will continue to be distributed to the workforce. This new messaging system will be implemented on June 1. The "MSFC-INTERCOM" mailbox will cease being used June 1 and will be disabled at the end of June. A message notifying users of the new messaging system will appear in "MSFC-INTERCOM" throughout the month of June. To submit Marshall Star content, email MSFC-Marshall Star. To submit Marshall E-TV slides, email MSFC-ETV.

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Marshall Team Readies for June 4 Family Celebration

Marshall Space Flight Center team members, retirees and their families are invited to the Marshall Exchange Family Picnic, from 10:30 a.m. to 3 p.m. June 4 at the walking trail, directly across the street from the Marshall Child Development Center. Use this convenient map to identify points of interest across the picnic area, and visit Inside Marshall for full details on the event. See you there! To view the picnic map, visit link to pdf.

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'Take Our Children to Work Day' Set for June 9

Kids Can Design Lego Robots, Journey Through the Solar System and Watch a Demo of Suitcase Thrusters

By Amie Cotton

Would your children like to train like an astronaut?

Bring them to work June 9 for the Marshall Space Flight Center's "Take Our Children to Work Day." They'll get the chance to do that -- and much more.

All team members with children in grades 3-12 are invited to participate in this event organized by the Office of Diversity & Equal Opportunity.

The day begins at 8:15 a.m. in the Activities Building 4316, where children can pick up a variety of space-themed mementos. Audrey Robinson, director of the Office of Diversity & Equal Opportunity, will welcome everyone and present highlights of what's in store for kids in the day's varied activities.

Children can choose from fun and educational projects – designing a Lego robot, building a balloon-powered lunar lander to "safely land astronauts" on the moon's surface, or maybe launching a hand-made straw rocket 50 feet high!

Think your children would like to take a journey through the solar system? Discover how big the planets are, how far away they are and see chemistry experiments to explore each planet's unique properties. Want to be an astronaut? Try your hand at astronaut training and learn the basics of human spaceflight. Ever want to experience the roar of a rocket launch? Check out the Acoustic Chamber in operation in the Test Laboratory.

They'll also learn about the chilling properties of liquid nitrogen, principles of recycling water and air in space, and produce "electricity" with household items.

Redstone Arsenal's fire prevention inspector will demonstrate how to stay safe during a house fire. Kids can explore a ladder truck and put out a virtual fire with a digital extinguisher unit.

The day will conclude with a grand finale: a demonstration of fiery suitcase thrusters used to maintain the orientation of the Sundancer space station module in low-Earth orbit!

For a complete schedule of events and other information, visit http://eo.msfc.nasa.gov/c2w/#sched.

To register your child, visit http://toctwd.msfc.nasa.gov/. The deadline is June 7.

Cotton, an AI Signal Research Inc. employee and the Marshall Star editor, supports the Office of Strategic Analysis & Communications.

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Marshall Association Announces Call for Scholarship Applications

The Marshall Association is accepting applications for its 2011 scholarships. The association plans to grant two scholarships including a $500 minimum scholarship for a student pursuing a bachelor's degree in a Science, Technology, Engineering and Mathematics, or STEM, field of study and a $500 minimum scholarship for a student pursuing a bachelor's degree in a non-STEM field of study.

Eligible applicants must be the dependent of a 2011 Marshall Association member -- current or retired civil service, or contractor members that have joined the association prior to July 1, 2011. In addition, all applicants must be entering their freshman year of college this fall.

Completed applications should be submitted to Sherry White by 4 p.m. CDT on July 1, 2011. No late applications will be accepted.

The scholarship application form can be accessed using the following link:
http://staging.cms.nasa.gov/centers/marshall/pdf/555302main_2011_scholarship_app.pdf

For more information about the Marshall Association, visit http://inside.msfc.nasa.gov/marshall_association/index.html.

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Marshall's Stars Shine at ISDC 2011
By Bart Leahy

Scientific and engineering experts from across Marshall Space Flight Center appeared as speakers and panelists at the National Space Society's International Space Development Conference (ISDC) May 18-22. With more than 850 registrants, the conference covered a broad variety of topics, from heavy-lift launch vehicles and the International Space Station to commercial space, space-based solar power, living in space, and the Google Lunar X Prize.

Image left: Chief Engineer for the Space Launch System Program Garry Lyles, left, explains engineering requirements at the Flight System Development Forum, accompanied by SLS Program Manager Todd May, center, and Deputy (Acting) Associate Administrator, Exploration Systems Mission Directorate, Dan Dumbacher. (Nancy Ostertag)

ISDC benefitted greatly from being hosted in Huntsville, as it was able to draw upon Marshall's expertise across the full range of space activities, as well as an enthusiastic National Space Society chapter, the Huntsville Alabama L5 Society (HAL5), and a team of civil service and contractor volunteers. Most of the tracks had at least one person from Marshall or Huntsville participating, and most of the others benefitted in some way from research performed here. This extensive center presence demonstrated that Marshall continues to have an important role in the space community.

For example, Charles "Les" Johnson, deputy manager of Marshall's Advanced Concepts Office, served as an individual presenter on in-space propulsion, a panelist on NASA's Technology Roadmapping Program, and a presenter on the authors track.

Other Marshall participants spoke on in-space nuclear power, NASA support for small businesses, outreach and education, the history of Wernher von Braun's team during the Apollo Program, Earth and planetary sciences, and space settlement.

In addition to its programming, ISDC 2011 featured an exhibit area in the Von Braun Center's North Hall, which included a large NASA booth with exhibits highlighting the agency's future direction, as well as a 1:10 scale model of the space shuttle main engine. Other exhibit hall participants included Dynetics, ATK, German aerospace contractor Astro- und

Feinwerktechnik Adlershof GmbH, NASA Federal Credit Union, patent law firm DeMont & Breyer, the Redstone Rocket, UAHuntsville, Space Camp, Schafer Corporation, Ecliptic Enterprises, as well as the National Space Society, and many other space-related nonprofit groups.

Huntsville Space Professionals and Next Step in Space hosted a space career fair, which enjoyed over 350 participants on May 20. On May 19 and May 21 participants and the public could attend lectures and panel sessions with eminent space authors, who were discussing, autographing and selling their books, as well as participating in panels discussing the future of humanity in space.

ISDC also played host to 150 students from around the world who participated in the Space Settlement Design Contest, which is sponsored every year by NASA Ames Research Center and the National Space Society. These students are invited to attend ISDC to discuss their entries in poster sessions in the exhibit hall and give 10-minute presentations prior to our track sessions. The contest and the interactions with space professionals and advocates provide an excellent opportunity to inspire the next generation of space pioneers.

ISDC continues to evolve and become more ambitious. The National Space Society looks forward to hosting another exciting event in Washington, D.C., in 2012, and hopes Marshall's team will continue to participate and add value to the national conversation about humans in space.

Leahy, a Schafer Corp. employee, supports the Office of Strategic Analysis & Communications and served as the 2011 ISDC conference chairman.

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Nearby Supernova Factory Ramps Up
Marshall news release

A local supernova factory has recently started production, according to a wealth of new data on the Carina Nebula from NASA's Chandra X-ray Observatory, managed by the Marshall Space Flight Center. This discovery may help astronomers better understand how some of the galaxy's heaviest and youngest stars race through their lives and release newly-forged elements into their surroundings.

Image right: This large Chandra image shows the Carina Nebula, a star-forming region in the Sagittarius-Carina arm of the Milky Way a mere 7,500 light years from Earth. (NASA/CXC/Penn State/L. Townsley et al.)

Located in the Sagittarius-Carina arm of the Milky Way a mere 7,500 light years from Earth, the Carina Nebula has long been a favorite target for astronomers using telescopes tuned to a wide range of wavelengths. Chandra's extraordinarily sharp X-ray vision has detected over 14,000 stars in this region, revealed a diffuse X-ray glow, and provided strong evidence that supernovas have already occurred in this massive complex of young stars.

"The Carina Nebula is one of the best places we know to study how young massive stars live and die," said Leisa Townsley of Penn State University, who led the large Chandra campaign to observe Carina. "Now, we have a compelling case that a supernova show in Carina has already begun."

One important piece of evidence is an observed deficit of bright X-ray sources in Trumpler 15, one of 10 star clusters in the Carina complex.

"This suggests that some of the massive stars in Trumpler 15 have already been destroyed in supernova explosions," said Junfeng Wang of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass., and the first author of a paper on

this cluster. "These stars were likely between 20 and 40 times the mass of the sun and would have exploded in the last few million years, which is very recent in cosmic terms."

The Smithsonian Astrophysical Observatory controls Chandra's science and flight operations from Cambridge.

The new Chandra survey also revealed the presence of six possible neutron stars, the dense cores often left behind after stars explode in supernovas, when previous observations had only detected one neutron star in Carina.

Neutron stars in star-forming regions are very difficult to spot because they are characterized by low-energy X-rays, which are easily absorbed by dust and gas. Therefore, the detected neutron stars probably represent only a small fraction of the complete population, providing strong evidence that the supernova activity is ramping up.

The diffuse emission observed by Chandra also supports the idea that supernovas have already erupted in Carina. Some of the diffuse X-ray emission almost certainly comes from the winds of massive stars, but some may also come from the remains of supernova explosions.

Another outcome from the new Chandra survey of Carina, which represents about 300 hours of observing time spread over nine months, is a new population of young massive stars. These stars had not been seen before because of obscuration, or because they are located outside well-studied clusters.

"We may have doubled the number of known young, massive stars in Carina by looking this long with Chandra," said Matthew Povich of Penn State, the first author of a paper on this new population. "Nearly all of these stars are destined to self-destruct in supernova explosions."

Undoubtedly the most famous constituent of the Carina Nebula is Eta Carinae, a massive, unstable star that may be on the verge of exploding as a supernova. When it does explode, it will likely be a spectacular -- yet still safe -- light in the Earth's sky. These latest results suggest Eta Carinae is not alone in its volatility.

"Supernovas aren't just eye-catching events, but they release newly-forged elements like carbon, oxygen and iron into their surroundings so they can join in the formation of new objects, like stars and planets," said Townsley.

The Chandra survey has a large field of 1.4 square degrees, made of a mosaic of 22 individual Chandra pointings. A great deal of multi-wavelength data has been used in this campaign including infrared observations from the Spitzer Space Telescope and the Very Large Telescope (VLT). The Carina results were presented at the 218th American Astronomical Society meeting in Boston May 24, and appeared in a special May 2011 Astrophysical Journal supplement issue of 16 papers devoted to the new Chandra observations of Carina.

More information on Chandra, visit: http://chandra.si.edu and http://www.nasa.gov/chandra.

Find this article at:

http://www.nasa.gov/centers/marshall/about/star/star110601.html